CLAIM AMENDMENTS:

1. (Currently amended) A method for updating coefficients in a decision feedback equalizer [[with]] having an ISI canceller for canceling inter-symbol interference (ISI) from a plurality of first signals received from a channel, the method comprising:

receiving the plurality of first signals having ISI;

decoding a first symbol comprising a set of the first signals having ISI to generate a decoded symbol having ISI, wherein the first symbol has (k+1) chips, and k is a natural number;

obtaining a vector of error values computed as the difference between the decoded symbol, and the first symbol;

generating a temp matrix according to the decoded symbol and the vector of the error values;

averaging the values of the elements in every diagonal line of the temp matrix to generate a Toeplitz Matrix; [[and]]

updating the coefficients by the Toeplitz Matrix; and

canceling the ISI from the decoded symbol with the ISI canceller, using the updated coefficients.

2. (Currently amended) The method as claimed in claim 1 further ~~comprises~~ comprising:

updating coefficients according to a least mean square algorithm:

$H(m+1)=H(m)+\mu T\{conj(E(m))\bullet C(m+1)\}$;

H(m) is coefficients at a symbol time m;

H(m+1) is coefficients at a symbol time (m+1);

[[i]] $\underline{\mu}$ is a predetermined gain;

T is the Toeplitz Matrix;

E(m) is the vector of error values; and

C(m+1) is the decoded symbol at the symbol time (m+1).

3. (Original) The method as claimed in claim 1, wherein, in the Toeplitz Matrix

$$\begin{bmatrix} h_{(k+1)} & h_{(k+2)} & \cdots & \cdots & h_{(2k+1)} \\ h_k & h_{(k+1)} & \cdots & \cdots & h_{2k} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ h_2 & h_3 & \cdots & \cdots & h_{(k+2)} \\ h_1 & h_2 & \cdots & \cdots & h_{(k+1)} \end{bmatrix}$$

, for any (2k+1)≥i> (k+1), the $h_{(i)} \ldots h_{(2k+1)}$ are equal to 0.

4. (Currently amended) A method for updating coefficients in a decision feedback equalizer [[with]] <u>having</u> an ISI canceller for canceling <u>inter-symbol interference (</u>ISI<u>)</u> from a plurality of first signals received from a channel, the method comprising:

<u>receiving the plurality of first signals having ISI;</u>

decoding a first symbol comprising a set of the first signals <u>having ISI</u> to generate a decoded symbol <u>having ISI</u>, wherein the first symbol has (k+1) chips, and k is <u>a</u> natural number;

obtaining a vector of error values computed as the difference between the decoded symbol, and the first symbol;

generating a temp [[M]]matrix T(m) according to the decoded symbol and the vector of the error values, wherein T(m) =

$$\begin{bmatrix} E^*(n-k)\cdot C(n-k) & E^*(n-k)\cdot C(n-(k-1)) & \cdots & \cdots & E^*(n-k)\cdot C(n) \\ E^*(n-(k-1))\cdot C(n-k) & E^*(n-(k-1))\cdot C(n-(k-1)) & \cdots & \cdots & E^*(n-(k-1))\cdot C(n) \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ E^*(n-1)\cdot C(n-k)) & E^*(n-1)\cdot C(n-(k-1)) & \cdots & \cdots & E^*(n-1)\cdot C(n) \\ E^*(n)\cdot C(n-k) & E^*(n)\cdot C(n-(k-1)) & \cdots & \cdots & E^*(n)\cdot C(n) \end{bmatrix},$$

where m is the symbol time of the first symbol, the chip times of the first symbol are from (n-k) to n, n and m are natural numbers and n=(k+1)m; E(n) is a vector of error values at the chip time n; and C(n) is the chip of the decoded symbol at the chip time n;

averaging the values of the elements in every diagonal line of the temp matrix to generate a Toeplitz Matrix $\begin{bmatrix} h_{(k+1)} & h_{(k+2)} & \cdots & \cdots & h_{(2k+1)} \\ h_k & h_{(k+1)} & \cdots & \cdots & h_{2k} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ h_2 & h_3 & \cdots & \cdots & h_{(k+2)} \\ h_1 & h_2 & \cdots & \cdots & h_{(k+1)} \end{bmatrix}$, wherein H(m) =

$$\begin{bmatrix} (\sum_{i=0}^{k} E^*(n-i)\cdot C(n-i))/(k+1) & (\sum_{i=0}^{k-1} E^*(n-(i+1))\cdot C(n-i))/k & \cdots\cdots & E^*(n-k)\cdot C(n) \\ (\sum_{i=0}^{k-1} E^*(n-i)\cdot C(n-(i+1)))/k & (\sum_{i=0}^{k} E^*(n-i)\cdot C(n-i))/(k+1) & \cdots\cdots & (\sum_{i=0}^{k-(k-1)} E^*(n-(i+k-1))\cdot C(n-i))/2 \\ \vdots & \vdots & \vdots\ \vdots & \vdots \\ (\sum_{i=0}^{k-(k-1)} E^*(n-i)\cdot C(n-(i+k-1)))/2 & (\sum_{i=0}^{k-(k-2)} E^*(n-i)\cdot C(n-(i+k-2)))/3 & \cdots\cdots & (\sum_{i=0}^{k-1} E^*(n-(i+1))\cdot C(n-i))/k \\ E^*(n)\cdot C(n-k) & (\sum_{i=0}^{k-(k-1)} E^*(n-i)\cdot C(n-(i+k-1)))/2 & \cdots\cdots & (\sum_{i=0}^{k} E^*(n-i)\cdot C(n-i))/(k+1) \end{bmatrix}$$

where H(m) is the Toeplitz Matrix at the symbol time m;

updating the coefficients by the Toeplitz Matrix; and

canceling the ISI from the decoded symbol with the ISI canceller, using the updated coefficients;

wherein the coefficients are updated according to a least mean square algorithm:

H(m+1)=H(m)+ $\mu T\{conj(E(m)) \bullet C(m+1)\}$;

H(m) is coefficients at a symbol time m;

H(m+1) is coefficients at a symbol time (m+1);

μ is a predetermined gain;

T is the Toeplitz Matrix;

E(m) is the vector of error values; and

C(m+1) is the decoded symbol at the symbol time (m+1).

5. (Canceled).

6. (Currently amended) The method as claimed in claim 4, wherein, in the

Toeplitz Matrix $\begin{bmatrix} h_{(k+1)} & h_{(k+2)} & \cdots & \cdots & h_{(2k+1)} \\ h_k & h_{(k+1)} & \cdots & \cdots & h_{2k} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ h_2 & h_3 & \cdots & \cdots & h_{(k+2)} \\ h_1 & h_2 & \cdots & \cdots & h_{(k+1)} \end{bmatrix}$, for any (2[[K]]k+1) $\geq$ i> (k+1), the

$h_{(i)} \ldots h_{(2k+1)}$ are equal to 0.

7. (Currently amended) A decision feedback equalizer, comprising:

an ICI canceller for canceling inter-chip interference (ICI) from a signal received from a channel and outputting a first signal without ICI; and

an ISI canceller, comprising:

a symbol decoder for decoding a first symbol comprising a set of the first signals to generate a decoded symbol; and

a symbol-base feedback filter with a plurality coefficients for transforming the decoded symbol by a Toeplitz Matrix H(m) to cancel <u>inter-symbol interference (</u>ISI<u>)</u> from the present decoded symbol, and generating an output signal;

wherein the first symbol has (k+1) chips, the Toeplitz Matrix is a (k+1)*(k+1) matrix, m is the symbol time of the first symbol, the chip times of the first symbol are from (n-k) to n, n, k and m are natural numbers and n=(k+1)m;

$$H(m)=\begin{bmatrix} (\sum_{i=0}^{k} E^*(n-i)\cdot C(n-i))/(k+1) & (\sum_{i=0}^{k-1} E^*(n-(i+1))\cdot C(n-i))/k & \cdots\cdots & E^*(n-k)\cdot C(n) \\ (\sum_{i=0}^{k-1} E^*(n-i)\cdot C(n-(i+1)))/k & (\sum_{i=0}^{k} E^*(n-i)\cdot C(n-i))/(k+1) & \cdots\cdots & (\sum_{i=0}^{k-(k-1)} E^*(n-(i+k-1))\cdot C(n-i))/2 \\ \vdots & \vdots & \vdots\ \vdots & \vdots \\ (\sum_{i=0}^{k-(k-1)} E^*(n-i)\cdot C(n-(i+k-1)))/2 & (\sum_{i=0}^{k-(k-2)} E^*(n-i)\cdot C(n-(i+k-2)))/3 & \cdots\cdots & (\sum_{i=0}^{k-1} E^*(n-(i+1))\cdot C(n-i))/k \\ E^*(n)\cdot C(n-k) & (\sum_{i=0}^{k-(k-1)} E^*(n-i)\cdot C(n-(i+k-1)))/2 & \cdots\cdots & (\sum_{i=0}^{k} E^*(n-i)\cdot C(n-i))/(k+1) \end{bmatrix}$$

where E(n) is a vector of error values computed as the difference between the chip of the decoded symbol at the chip time n, and the chip input to the symbol decoder at the chip time n, and C(n) is the chip of the decoded symbol at the chip time n.

8. (Currently amended) The decision feedback equalizer as claimed in claim 7, wherein the coefficients are updated according to a least mean square algorithm:

H(m+1)=H(m)+$\mu T\{\text{conj}(E(m)) \bullet C(m+1)\}$;

H(m) is coefficients at a symbol time m;

H(m+1) is coefficients at a symbol time (m+1);

[[i]] $\underline{\mu}$ is a predetermined gain;

T{ } is the Toeplitz Matrix;

E(m) is the vector of error values; and

C(m+1) is the decoded symbol at the symbol time (m+1).

9. (Original) The decision feedback equalizer as claimed in claim 7, wherein the

Toeplitz Matrix $\begin{bmatrix} h_{(k+1)} & h_{(k+2)} & \cdots & \cdots & h_{(2k+1)} \\ h_k & h_{(k+1)} & \cdots & \cdots & h_{2k} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ h_2 & h_3 & \cdots & \cdots & h_{(k+2)} \\ h_1 & h_2 & \cdots & \cdots & h_{(k+1)} \end{bmatrix}$ at the symbol time m is

$$\begin{bmatrix} E^*(n-k)\cdot C(n-k) & E^*(n-k)\cdot C(n-(k-1)) & \cdots & \cdots & E^*(n-k)\cdot C(n) \\ E^*(n-(k-1))\cdot C(n-k) & E^*(n-(k-1))\cdot C(n-(k-1)) & \cdots & \cdots & E^*(n-(k-1))\cdot C(n) \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ E^*(n-1)\cdot C(n-k)) & E^*(n-1)\cdot C(n-(k-1)) & \cdots & \cdots & E^*(n-1)\cdot C(n) \\ E^*(n)\cdot C(n-k) & E^*(n)\cdot C(n-(k-1)) & \cdots & \cdots & E^*(n)\cdot C(n) \end{bmatrix}$$, and

when the channel is steady, the values of the elements in the diagonal lines of the Toeplitz Matrix are almost the same, $h_{11}=h_{22}=\ldots=h_{(k+1)(k+1)}$, $h_{21}=h_{32}=\ldots=h_{(k+1)k},\ldots,h_{k1}=h_{(k+1)2}$, $h_{12}=h_{23}=\ldots=h_{k(k+1)}$, $h_{13}=h_{24}=\ldots=h_{kk},\ldots,h_{1k}=h_{2(k+1)}$.

10. (Original) The decision feedback equalizer as claimed in claim 7, wherein, in

the Toeplitz Matrix $\begin{bmatrix} h_{(k+1)} & h_{(k+2)} & \cdots & \cdots & h_{(2k+1)} \\ h_k & h_{(k+1)} & \cdots & \cdots & h_{2k} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ h_2 & h_3 & \cdots & \cdots & h_{(k+2)} \\ h_1 & h_2 & \cdots & \cdots & h_{(k+1)} \end{bmatrix}$, for any $(2k+1) \geq i > (k+1)$, the

$h_{(i)} \ldots h_{(2k+1)}$ are equal to 0.